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To:	Saric, James
Cc:	Patricia.White@CH2M.com; Frank.Dillon@CH2M.com; William.Andrae@CH2M.com
Subject:	Kalamazoo River FS Comments
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Jim, attached are our latest draft FS comments. Let me know if you have any questions or clarifications. I am sending over in WORD form without numbering so you may add EPA comments as needed. I will send over a final version once we have discussed with you and the MDEQ. If you want to add EPA comments to this list once you are done I will number the comments and resubmit as final.

Thanks

JK

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Kalamazoo River Superfund Site Area 1 Feasibility Study
Preliminary Draft Review Comments
Draft 1-18-2012

GENERAL COMMENTS

Commenting Organization: CH2M HILL **Commenter: Saric/Keiser**
General Comment #:

Key information that is currently provided in Appendix A (the revised ASTM) needs to be moved into the main body of the report, including full descriptions of the TCRAs, summaries of the RI results and conceptual site model, and the development of the PRGs. Several of these items are discussed further in other general comments below.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

The main body of the FS report would benefit from more "stage setting" before describing and evaluating the remedial alternatives for Area 1 sediments and floodplain soils. Please add a subsection to Section 1 that summarizes the conceptual site model (CSM) for Area 1. Most of the information related to the CSM is in Appendix A or in other sections of the FS report. The CSM should include:

- Physical description of the river system
- Nature and extent of contamination (summary of RI findings), including a table summarizing PCB mass and average concentration estimates for hot spots, Crown Vantage, Portage Creek (post-TCRA), river sections 1-8 (excluding hot spots and Crown Vantage), river banks (main channel and post-TCRA Portage Creek), natural floodplains (main channel and post-TCRA Portage Creek), floodplains within the former impoundments.
- Full description of PCB fate and transport processes, including assessments of channel stability and bank erosion, water column transport, sediment transport, sediment-water transfer processes, and bioaccumulation processes. Bank erosion, channel stability and overall geomorphology of the river should be more fully described and considered because these processes control future loading of PCBs to the river, and therefore future fish tissue concentrations.
- Pathways and receptors associated with unacceptable risks.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

Section 1 of the report should include a subsection that describes all of the TCRAs and summarizes all available information about their effectiveness (including an assessment of whether it is "too soon to tell"). This section should include maps showing the extent of the removal actions in the three TCRA areas. This information is important to present at the beginning of the report because it provides insight into the potential effectiveness of the remedial action being considered in the FS.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

The scale of evaluation (area-wide decision unit) is too large for remedy decision-making. Pre- and post-remedy sediment SWACs should be reported on a river section basis rather than an area-wide basis.

Commenting Organization: CH2M HILL **Commenter: Saric/White**
General Comment #:

Some of the assumptions and methods used to estimate future fish tissue concentrations need to be revisited, including:

- The assumption that the future sediment recovery rate is the same as the historical rate of fish tissue decline in PCB concentration
- A step change (reduction) in fish tissue concentrations occurs when remedial action is completed
- The use of wet weight fish tissue data rather than lipid-normalized data to establish historical trends

Additionally, the presentation of the results of the future fish tissue projections is difficult to interpret and compare across alternatives. Specific comments regarding these topics and others are provided in the comments to Appendix E.

Commenting Organization: CH2M HILL **Commenter: Saric/White**
General Comment #:

RAO 1 should incorporate (1) the expected increase in allowable fish meals; (2) the target risk and hazard levels for protection, and (3) the time frame to achieve them, as follows:

> Protect humans who consume Kalamazoo River fish from exposure to PCBs that exceed protective levels. The RAO is expected to be progressively achieved over time by meeting the following targets for sediment and fish tissue:
> - Sediment Target – achieve a surface-weighted average PCB concentration of 0.33 mg/kg in each of the eight segments within Area 1 of the Kalamazoo River within 10 years following remedy implementation
> - Fish Tissue Targets
> - A reduction in the Michigan fish advisory level for smallmouth bass to one meal per week (0.2 mg/kg total PCB concentration in fish tissue)
> - Achievement of a non-cancer hazard index (HI) of 1.0 and a cancer risk of 10-5 for the high end sport angler (100% bass diet) within 10 years following remedy implementation

This comment applies to all sections of the FS report where RAOs are presented.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

More discussion is needed to justify the use of sediment PRG that is above RBCs for the high end sport angler (equivalent to the RME scenario typically used by EPA for remedial decision-making). If risk-based RBCs based on the RME are not achievable over a reasonable time frame, then discussion in the FS needs to be expanded to make this case.

Commenting Organization: CH2M HILL **Commenter: Saric/White**
General Comment #:

Revise RAO 4 as follows:

> Reduce the transport of PCBs from Area 1 to downstream areas and Lake Michigan, including transport of PCBs from riverbank and floodplain soils to the Kalamazoo River.

This RAO is intended to reduce the rate of transport of PCBs from Area 1 to downstream areas of the Kalamazoo River and Lake Michigan. Ongoing monitoring of channel stability should be included in the MNR component of the remedial alternatives to monitor these transport pathways. If sediment and fish tissue PCB levels don't decrease as expected through natural recovery, then the ongoing loading from the banks and floodplain may need to be re-examined more closely. This comment applies to all sections of the FS report where RAOs are presented.

Commenting Organization: CH2M HILL **Commenter: Saric**
General Comment #:

Future bank and floodplain soil erosion in the former Plainwell impoundment Plainwell #2 dam area is not adequately addressed in the FS. The FS references the 2007 AOC for the former Plainwell impoundment with respect to long-term monitoring and maintenance of the channel banks in these areas. However, the remedial alternatives for floodplain soils need to be evaluated in the FS with respect to RAO 4 – how does each alternative prevent the transport of PCBs in bank and floodplain soils to the channel?

Commenting Organization: CH2M HILL **Commenter: Saric**
General Comment #:

Sediment alternatives – alternative SED-2 is essentially the same as SED-1, and neither alternative is protective. Why include alternative SED-2?

Commenting Organization: CH2M HILL **Commenter: Saric**
General Comment #:

Another sediment alternative that could be considered is targeted removal above a specified RAL (e.g., 5 mg/kg) in specific section(s) of Area 1, rather than applying the RAL in every section.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

Sediment and Floodplain Alternatives - delete the component that states "following completion of the Portage Creek TCRA." The TCRA is not a component of the current remedial action. This comment applies to all sections of the FS report where alternatives are listed.

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

The estimated sediment SWACs in the former Plainwell Impoundment and Plainwell No. 2 dam area are higher than the SWACs in the other river sections. The channel in the former Plainwell Impoundment is in the process of reaching a new equilibrium state after removal of the dam. Baseline monitoring prior to remedy implementation should include sediment sampling to verify that channel sediments in these areas are recovering as expected (i.e., to verify whether any hot spots remain).

Commenting Organization: CH2M HILL **Commenter: White**
General Comment #:

The FS assumes that the long-term monitoring program will include only fish tissue monitoring. The sediment and floodplain remedial alternatives are based on assumptions that will need be verified after the remedy is implemented (e.g., the sediment prism in the former Plainwell impoundment will be eroded as the river channel reaches a new equilibrium state; the banks in the former Plainwell impoundment and Plainwell #2 dam area will remain stable and will not provide an ongoing source of PCBs to the channel; floodplain soils in the former impoundments will not act as a significant source of PCBs to the river channel even under high flow conditions). Additionally, uncertainty remains regarding the risk to ecological receptors exposed to floodplain soils. Therefore, the scope of the long-term monitoring component of the remedy must be expanded to include verification of the critical assumptions used in the FS and the protectiveness of the remedy.

Commenting Organization: CH2M HILL **Commenter: Saric/Dillon**
General Comment #:

The recent publication by Gillian et.al. 2013 indicates that the relative sensitivity of avian receptors to the effects of dioxins/furans and dioxin like PCB congeners is more complex than the simple classification system of high, moderate and low sensitivity. The results of the current research suggest that these is no simple ratio of species sensitivity between the groups based on AhR structure and that the relative sensitivity is also affected by the mix of congeners, which suggest that sensitivity is partially site-specific.

EPA acknowledges that there continues to be uncertainly around this issue as the science develops further. However, EPA believes that it is inappropriate and premature to conclude in the FS that current conditions are adequately protective of avian species and therefore RAO 3 has been achieved. The uncertainty raised by Gillian et.al., 2013 needs to be acknowledged and any discussion of current conditions need to reflect the potential risk to a sensitive avian species at the site.

EPA does not believe it is necessary to revise the language in the ASTM document but text should be included in the FS that indicates that following drafting of the ASTM that further research has been published that indicates that the relative sensitivity of avian receptors is more complex than previously thought and that the text of the TBERA and ASTM do not reflect that

uncertainty. However, that uncertainty is considered in the FS when characterizing current conditions and the relative risk reduction of the various alternatives.

G E. Manning, L. J. Mundy, D. Crump, S. P. Jones, S. Chiu, J. Klein, A. Konstantinov, D. Potter, and S. W. Kennedy. 2013. Cytochrome P4501A induction in avian hepatocyte cultures exposed to polychlorinated biphenyls: Comparisons with AHR1-mediated reporter gene activity and *in ovo* toxicity. Toxicology and Applied Pharmacology 266 (2013) 38–47

Commenting Organization: CH2M HILL **Commenter: Saric/Dillon**
General Comment #:

Given the uncertainty raised by the Gillian et.al. (20013) results EPA believes that floodplain soils alternatives FP-1 and FP-2 would require some form of biological monitoring and re-evaluation as new research is completed to assure that residual risk to maximally exposed and sensitive wildlife is acceptable.

Commenting Organization: CH2M HILL **Commenter: Saric/Dillon**
General Comment #:

The SRI and ASTM documents have analyzed and discussed the floodplains associated with the Former Plainwell Impoundment, Plainwell No. 2 dam, and natural floodplain areas separately. The TBERA concluded that there was no unacceptable risk from in the natural floodplain areas. The analysis in the ASTM and FS of areas requiring potential remediation is based on one and two acre wildlife home ranges. Give the distance between the Former Plainwell Impoundment and Plainwell No. 2 dam areas it is inappropriate to only present FS evaluation based on a combination of the two areas. The FS must include a discussion of current conditions in each area and an evaluation of the potential risk reduction by area.

Commenting Organization: CH2M HILL **Commenter: Saric/Dillon**
General Comment #:

Section 5.2.1 of the ASTM page 5-17 when discussing the RBCs for floodplain soils states the following "the true toxicity threshold likely lies somewhere between the NOAEL and LOAEL values. As such, the geometric mean of the NOAEL and LOAEL is considered a reasonably conservative estimate of the potential toxicity threshold." To be consistent with the ASTM therefore, the PRG for floodplain soils to be adopted in the FS should be 11 mg/kg PCBs. This RBC is assumed to be protective of maximally exposed wildlife.

Based on the analysis in the ASTM, this RBC is shown to be protective of 94% of the home ranges for maximally exposed mammalian receptors such as the shrew. The RBC of 11 mg/kg PCBs is also assumed to be protective of avian receptors as it represents a balance between risk and uncertainty surrounding the various methodologies and assumptions for calculating risk to avian receptors employed in the TBERA. A PRG of 11 mg/kg PCBs is protective of high sensitivity vermivorous and insectorivorous birds assuming dietary exposure models but is protective of minimal home ranges (1%) assuming egg-based exposure models.

Commenting Organization: CH2M HILL **Commenter: Saric/Dillon**
General Comment #:

The ASTM and FS use 80% of home ranges as an assumed threshold for protection of local populations. But no rational is provided to support that value. To avoid lengthy discussions concerning an appropriate threshold, eliminate any discussion of a target percentage of home range assumed to be protective of populations. The evaluation should focus on the risk reduction from current conditions both in the number of home ranges and the overall acreage for the individual Target Areas. Protection of local populations can be discussed in this context.

Commenting Organization: CH2M HILL **Commenter: Andrae/Keiser**
General Comment #:

Sediment Alternatives – The term "conventional construction equipment" is used often to describe the mechanical excavation of the sediment; however, details on how the sediment is to be removed and staged in the alternatives description text are minimal. It would be helpful to provide more detail in the up-front text, versus the cost estimate notes on how the sediment would be excavated and managed. Some suggested details include:

- Excavators located on the shore or on floats
- Use of environmental buckets or clamshells versus conventional buckets or clamshells
- Size and loading of barges acceptable for use on the Kalamazoo River
- Location of staging areas (show on figures and provide schematic of staging area)
- Figure of typical hotspot excavation layout including silt fencing, access roads and monitoring locations.
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- Sediment offloading structure and dewatering procedure

Commenting Organization: CH2M HILL **Commenter: Bill Andrae**
General Comment #:

Floodplain Soils – Is armoring of the banks to prevent erosion included in the alternatives?

SPECIFIC COMMENTS

Commenting Organization: CH2M HILL **Commenter: White**
Section: Figure ES **Page #:** **Lines #: NA**
Specific Comment #:

The Executive Summary should be revised after the comments on the main report have been addressed.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: ES **Page #: ES-7** **Lines #: NA**
Specific Comment #:

The fourth sentence of the first full paragraph of the page reads, "Based on this evaluation, PCB PRGs of 11 and 18 mg/kg were selected for floodplain soils."

Change the text to read, "Based on this evaluation a PCB PRG of 11 mg/kg was selected for floodplain soils and is assumed to be protective of maximally exposed wildlife."

Commenting Organization: CH2M HILL **Commenter: White**
Section: 1.2 **Page #: 1-6, 1-7** **Lines #:**
Specific Comment #:

"The available data indicate that exposure to PCBs will drive risks at the Site, and that management of risks due to PCB exposure will also address risks associated with other constituents." GP's response to USEPA General Comment #1 on the ASTM indicated that the Area 1 FS report would include a discussion of non-PCB constituents and would describe how the reduction of these constituents would be documented. The discussion in the draft FS report cites the co-occurrence evaluation provided in Appendix M of the Area 1 SRI report, but does not address how the remedial alternatives will reduce concentrations of non-PCB constituents.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 2 **Page #: 2-1** **Lines #:**
Specific Comment #:

First bullet – "Due to conservatism and uncertainty associated with RBC calculations, exceedances of the lower range of RBCs do not necessarily indicate that receptors are not protected." Either delete this sentence or include a more comprehensive discussion of the uncertainties associated with the RBCs developed for Area 1.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 2.1.1 **Page #: 2-2** **Lines #:**
Specific Comment #:

Add Table 8-7 from the Area 1 SRI report (Risk-Based Concentrations for Fish and Sediments Derived by CDM (2003b) Based on the Angler Scenarios Evaluated in the CDM HHRA), and text to summarize how the RBCs were derived. Add more discussion in this section about the level of human health protection that is expected to be achieved, and justification for why a lower PRG (i.e., a PRG that would achieve a higher level of human health protection) was not selected.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 2.1.2 **Page #: 2-3** **Lines #:**
Specific Comment #:

"While the hot spots do not have a significant impact on the Area 1-wide SWAC due to their small size and therefore limited opportunity for exposure/risk reduction, they do contain inventories of PCBs that could potentially remobilize if the deposits were not stable during future conditions." This sentence implies that the rationale for targeting hot spots is to address RAO 4 rather than RAOs 1 and 2. However, the scale of evaluation in the FS (area-wide SWAC) is too large to evaluate exposure and potential risk reduction. Revise this paragraph to indicate

that the rationale for developing and evaluating remedial alternatives for hot spot areas is to address RAOs 1, 2, and 4.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 2.2 **Page #: 2-6** **Lines #: NA**
Specific Comment #:

The second paragraph of the section states, "This evaluation considers the potential PRGs and a range of RALs to identify whether or not a remedial action in the Target Areas would result in a significantly higher level of protection beyond the current post-removal action conditions for ecological receptors in the TCRA areas."

Edit the text to say, "This evaluation considers the potential PRGs and a range of RALs to identify an appropriate PRG and RAL that can be used to meet RAO 3 and evaluate risk reduction for ecological receptors beyond the current post-removal action conditions for Target Areas."

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 2.2.1 **Page #: 2-7** **Lines #: NA**
Specific Comment #:

The last two sentences of the second paragraph read, "Based on the range of potential PRGs and their relative confidence, in combination with the detailed RAL analysis presented in Section 5.2.2 of the Area 1 ASTM, the lowest dietary RBCs from the Area1 TBERA (i.e., based on the shrew) are proposed as PRGs. The lowest observable adverse effect level (LOAEL)-based RBC for shrews is 18 mg/kg, and the geometric mean of the no observable adverse effect level (NOAEL) and LOAEL is 11 mg/kg PCB. While the LOAEL is often considered a reasonable estimate when addressing population-level effects, for conservatism, both the LOAEL and the geometric mean values have been carried forward as floodplain soil PCB PRGs for this Area 1 FS Report."

Change the text to read as follows, "Based on the range of potential PRGs and their relative confidence, in combination with the detailed RAL analysis presented in Section 5.2.2 of the Area 1 ASTM, the lowest dietary RBCs from the Area1 TBERA (i.e., based on the shrew) were selected to derive the proposed as PRG. The proposed PRG for floodplain soils to be adopted in the FS is 11 mg/kg PCBs. This PRG is the geometric mean of the no observable adverse effect level (NOAEL) and lowest observable adverse effects level (LOAEL) and is considered a reasonably conservative estimate of the potential toxicity threshold that would be protective of maximally exposed wildlife species. Based on the analysis in the ASTM, this RBC is shown to be protective of 94% of the home ranges for maximally exposed mammalian receptors such as the shrew. The RBC of 11 mg/kg PCBs is also assumed to be protective of avian receptors as it represents a balance between risk and uncertainty surrounding the various methodologies and assumptions for calculating risk to avian receptors employed in the TBERA."

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 2.2.2 **Page #: 2-8** **Lines #:**
Specific Comment #:

As discussed in the general comments any reference to an 80% target of home ranges and a PRG other than 11 mg/kg PCBs should be removed.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: Figure 2.2.2 **Page #: 2-8** **Lines #:**
Specific Comment #:

To be consistent with the presentation in section 2.2.3, a table should be added similar to Table 2-3 showing the results under the RAL of 20 mg/kg PCB.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 2.3.1 **Page #: 2-10** **Lines #:**
Specific Comment #:

Footnote 2 in Table 2-4 is not defined.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 3 **Page #: 3-1** **Lines #:**
Specific Comment #:

Last sentence – ". . . . [SED-2 and FP-2] will be evaluated against the evaluation criteria listed above except for reduction in toxicity, mobility or volume through treatment." Every alternative must be evaluated for all of the balancing criteria, even if no reduction in toxicity, mobility or volume through treatment is achieved.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 3.1 **Page #: 3-1, 3-2** **Lines #:**
Specific Comment #:

Overall protection of human health and the environment – for RAOs 1 and 2, the time frame over which reductions in sediment and fish tissue PCB concentrations are expected to occur should be included in this overall evaluation. For floodplain soils, RAO 4 should also be evaluated by assessing the degree to which the alternative reduces PCB loading from the river banks and floodplain to the channel.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 3.4 **Page #: 3-3** **Lines #:**
Specific Comment #:

Delete the last sentence in Section 3.4. Reduction in toxicity, mobility and volume through treatment should be evaluated for every alternative (this comment also applies to the last sentence in the first paragraph of Section 4.1).

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.1 **Page #: 4-3** **Lines #:**
Specific Comment #:

First paragraph – expand the definition of dynamic equilibrium to indicate that erosion and deposition occur within the channel, but result in no net sediment accumulation or loss over time.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.1 **Page #: 4-6** **Lines #:**
Specific Comment #:

Please present the fish tissue PCB data in Figure 4-3 on a lipid-normalized basis. The text discusses time-series plots of lipid-normalized PCB data, but the plots presented in Figure 4-3 report wet weight data.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.1 **Page #: 4-6** **Lines #:**
Specific Comment #:

Second paragraph – this paragraph states that erosion of buried sediments and PCBs in Area 1 is unlikely because a hot spot was present at the same location in the river channel before and after a 25-year storm event that occurred in 2008. This observation alone is insufficient to conclude that all buried sediments and PCBs in Area 1 are stable under high flow conditions. Please provide a more rigorous analysis of sediment stability, including consideration of a 100-year storm as recommended in EPA's Contaminated Sediment Remediation Guidance (2005). This comment also applies to Section 4.1.3.3.1 and Section 4.2.3, Adequacy of Control Measures.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.1 **Page #: 4-6** **Lines #:**
Specific Comment #:

Include an analysis of channel stability in the description of current river conditions (e.g., based on time-series aerial photograph analysis of channel configuration as an indication of long-term stability; erosion pin survey data as an indicator of short-term stability).

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.1 **Page #: 4-6** **Lines #:**
Specific Comment #:

Third paragraph – "Following control of <u>all</u> external paper industry-related sources of PCBs in Area 1 . . ." (underline added) – PCBs from historical paper-making operations that remain in unremediated channel sediments and floodplain soils in Area 1 will continue to influence PCB concentrations in fish tissue. Revise this paragraph accordingly. In addition, please clarify the meaning of the second sentence (" . . . fate and transport processes internal to Area 1 along with habitat and biological factors will govern the extent and temporal response of PCB levels in fish tissue.")

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.2.2 **Page #: 4-7** **Lines #:**
Specific Comment #:

All of the sediment alternatives except for SED-1 include MNR as a key component of the remedy; however, the description of MNR processes is limited to one sentence. Either in this section or in the CSM, provide more detail about recovery processes and expected recovery rate.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.2.2 **Page #: 4-7** **Lines #:**
Specific Comment #:

Section 6.3.3 of the ASTM indicates that thin-layer capping was retained as a representative process option for enhanced MNR to address post-removal residual contamination. Would enhanced MNR also be effective in other portions of Area 1 (e.g., the unremediated portion of Portage Creek; former Plainwell Impoundment and Plainwell No. 2 area) given that recovery rates are expected to be slow? Add text to indicate that enhanced MNR (thin layer capping) in selected areas may be included as a component of the remedy.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.2.2 **Page #: 4-8** **Lines #:**
Specific Comment #:

Long-term monitoring will be a key component of the Area 1 remedy because every alternative under consideration relies on MNR. The LTM program should include sediment, surface water and fish tissue sampling as well as an assessment of channel stability to better understand how the river system is recovering and evaluate whether the RAOs have been achieved.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3 **Page #:** **Lines #:**
Specific Comment #:

The tables summarizing the detailed evaluation of remedial alternatives will need to be updated after the specific comments are addressed.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1 **Page #: 4-17** **Lines #:**
Specific Comment #:
Second paragraph – "These future fish tissue PCB concentration projections were then used to calculate associated human health and ecological risks over time." It would be simpler and easier to understand to compare the projected fish tissue concentrations to RBCs and fish tissue advisory levels.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1.1 **Page #: 4-18** **Lines #:**
Specific Comment #:

Third paragraph – "Thus, reduction of PCB levels in Area 1 sediments and fish is expected to result in achievement of RAOs 1 and 2 . . ." This section needs to be specific about the level of protection that will be achieved and the time frame that will be required.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1.1 **Page #: 4-18** **Lines #:**
Specific Comment #:

The discussion of RAO 4 addresses only water column transport. Also evaluate future loading to the river channel from river banks and floodplains, and sediment transport within the channel. This comment applies to the description of every remedial alternative.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1.1 **Page #: 4-19** **Lines #:**
Specific Comment #:

First sentence – delete RAO 2, and change " . . . the continuation of fish consumption advisories can protect human health" to " . . . fish consumption advisories would be used to facilitate human health protection."

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1.1 **Page #: 4-19** **Lines #:**
Specific Comment #:

Second paragraph – " . . . however, there may be limitations on the lowest achievable levels in fish due to low-level continuing sources of PCBs." This paragraph should be more specific about the range of tissue PCB concentrations and level of protection that are expected to be achieved.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.1.3.1.2 **Page #: 4-19** **Lines #:**
Specific Comment #:

First paragraph – "Removal of PCB-containing sediments . . . may support the reduction in PCB levels in fish over time (RAOs 1 and 2)." Change "may" to "will."

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.1 **Page #: 4-33** **Lines #:**
Specific Comment #:

First paragraph, last sentence – "Now that significant source control has been completed, future rates of recovery may be expedited." Change "may be expedited" to "may change." As the major sources of PCBs to fish are controlled, the PCB attenuation rate in fish tissue is more likely to slow down given the expected slow recovery rate for sediments.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.1 **Page #: 4-33** **Lines #:**
Specific Comment #:

Second paragraph – "Furthermore, it should be noted that the calculations presented herein do not average exposures which are already declining." Please revise this sentence to clarify its meaning.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.1 **Page #: 4-33** **Lines #:**
Specific Comment #:

RAO 1 – the plots in the Figure 4-4 and 4-5 series require explanation before presenting the results. The explanatory information in Appendix E should be incorporated into the main text. Alternatively, the plots could be revised to simplify and clarify the presentation.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.3 **Page #: 4-38** **Lines #:**
Specific Comment #:

Second paragraph – "These efforts and processes have resulted in substantial long-term declines in PCB concentrations in surface water and fish tissue . . . " Add specific estimates of the long-term declines in surface water and fish tissue.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.3 **Page #: 4-39** **Lines #:**
Specific Comment #:

First full paragraph, last sentence – " . . . and thereby may reduce future exposures or inventory in areas that although historically stable to a large degree, could become remobilized." Delete the phrase "that although historically stable to a large degree" – the sediment stability analysis currently presented in the FS report is insufficient to support this statement.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.3 **Page #: 4-40** **Lines #:**
Specific Comment #:

Magnitude of residual risk – pre- and post-remedy sediment SWACS should be presented on a river section basis.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.3 **Page #: 4-42** **Lines #:**
Specific Comment #:

Last sentence in Section 4.2.3 – additional 5-year reviews will be required if RAOs have not been achieved after 5 years.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.5 **Page #: 4-46** **Lines #:**
Specific Comment #:

Table 4-7 – the estimated time to achieve risk targets for human health should be based on the high end sport angler scenario, which is equivalent to the RME scenario typically used by USEPA for remedial decision making.

Commenting Organization: CH2M HILL **Commenter: White**
Section: 4.2.7 **Page #: 4-50** **Lines #:**
Specific Comment #:

Delete the paragraph below the bullets. EPA will identify the most cost effective alternative.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.1.1 **Page #:** **Lines #:**
Specific Comment #:

As indicated in General Comment X, discussion of current conditions in the floodplain should be based on individual target areas.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.1.1 **Page #: 5-4 and 5-5** **Lines #:**
Specific Comment #:

The last paragraph of this section should focus on describing the current conditions relative to the proposed PRG of 11 mg/kg which is assumed to achieve RAO 3. Re-write the text to simply describe the percent of home ranges and acreage that are considered protective and those that are considered to pose risk to maximally exposed wildlife. Any discussion of whether RAO 3 is met under current conditions should be presented in Section 5.1.3.1 and along with the relative risk reduction discussion under each alternative.

Commenting Organization: CH2M HILL **Commenter: Bill Andrae**
Section: 5.1.2.3 **Page #: 5-6** **Lines #: Last Sentence**
Specific Comment #:

Earlier in the paragraph, it is stated that common borrow material will be used as when backfilling; however, the last sentence indicates sand will be used when backfilling. Subsequent sections refer to common borrow material for backfilling. Is there a specific reason for using sand in Alternative FP-3? Is it appropriate backfill material given the issues with erosion in other floodplain soil areas?

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.1.3.1 **Page #: 5-11** **Lines #: NA**
Specific Comment #:

Discussion of the current conditions relative to RAO 3 should be presented in this section. The discussion should address issues raised in General Comment X and discuss the residual risk and uncertainty acknowledging that with the PRG of 11mg/kg total PCBs that residual risk is present assuming sensitive species and the RAO is currently not achieved under that assumption.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.2.1 **Page #: 5-24** **Lines #: NA**
Specific Comment #:

As discussed in General Comment X, EPA believes that it is inappropriate and premature to conclude in the FS that current conditions are adequately protective of avian species and therefore RAO 3 has been achieved. The uncertainty raised by Gillian et.al., 2013 needs to be acknowledged and any discussion of current conditions need to reflect the potential risk to a sensitive avian species. The alternatives need to be evaluated accordingly.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.2.3 **Page #: 5-26** **Lines #: NA**
Specific Comment #:

This section needs to be revised to be consistent with previous comments. This discussion should be by target area and by percent of home ranges that show residual risk at the PRG across the range of uncertainty. Delete any reference to a specific number of home ranges protective of populations. Protection of local populations can be discussed relative to the number of and area extent of home ranges that exceed.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Section: 5.2.7 **Page #: 5-4** **Lines #: NA**
Specific Comment #:

The discussion of cost should include the monitoring that would be necessary to support the selection of FS-1 or FS-2. The section will need to be revised to address the risk reduction relative to current conditions following modifications to address General Comment X.

Commenting Organization: CH2M HILL **Commenter: Dillon**
Figure: 5-1 **Page #: 5-35** **Lines #: NA**
Specific Comment #:

The figure will need to be modified to address the issues raised in General Comment X and Specific Comment X, Section 5.2.7 .

Commenting Organization: CH2M HILL **Commenter: White/Dillon**
Section: 6 **Page #:** **Lines #:**
Specific Comment #:

Update Section 6 to be consistent with the changes made in previous sections in response to these comments.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: ES-4** **Lines #:**
Specific Comment #:

Bank sources, first bullet - the first sentence states "At USEPA's request, an evaluation of PCB sources from remaining river banks in Area 1 is included in this Area 1 ASTM . . " Add an assessment of the banks in the former Plainwell Impoundment and Plainwell No. 2 dam area in the analysis.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: ES-4** **Lines #:**
Specific Comment #:

Bank sources, first bullet, 11th line – after the sentence reads "The remaining entire river bank PCB inventory in Area 1 would have to be almost completely eroded to equal just the annual load from the former Plainwell bank," add the following sentence: "However, ongoing erosion of PCB-containing bank soils will continue to be a source of PCBs to fish."

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: ES-4** **Lines #:**
Specific Comment #:

Bank sources, second bullet – "The inventory of PCBs in the remaining river bank area is small and not a significant ongoing source to the river." Revise this sentence to be specific about "small" – the inventory is small compared to what? Delete the phrase "and not a significant ongoing source to the river" because the significance of the source has not yet been established – future monitoring will determine whether or not bank erosion is limiting the PCB attenuation rate for fish tissue.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: ES-5** **Lines #:**
Specific Comment #:

Remedial Approach for Sediments – "This long-term SWAC goal will conservatively be applied to Area 1 as a whole based on the assumption that fish habitat is similar across Area 1 and fish exposure is integrated across Area 1 due to minimal barriers to fish migration." As noted in the general comments, Area 1 should be divided into sections for the purposes of evaluating long-term effectiveness of the various remedial alternatives for sediment.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 1-3** **Lines #:**
Specific Comment #:

First full paragraph, last sentence - "PCBs are the only contaminants of concern (COCs) addressed in the approved risk assessments and completed remedial actions at the site." Please refer to the specific comment on Section 1.2 regarding non-PCB constituents.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 1-4** **Lines #:**
Specific Comment #:

Fourth paragraph - this paragraph summarizes the TCRAs in the former Plainwell impoundment and Plainwell No. 2 dam area, and states that "these removal actions controlled sources of PCBs associated with erosion of exposed former sediments, and removed targeted floodplain soils with high PCB concentrations." As indicated in the general comments, include a map in the FS that shows the extent of the TCRA removal actions and areas of bank stabilization in the former Plainwell Impoundment and Plainwell No. 2 dam area.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 2-4** **Lines #:**
Specific Comment #:

Section 2.4, 11th line – " . . are supportive of the recovery of PCB levels in fish." Change "recovery" to "reduction."

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-9** **Lines #:**
Specific Comment #:

Fifth line – "The Area 1 FS will incorporate results of the monitoring program in considering the permanence and effectiveness of the removal action." Where in the FS is this information reported? As indicated in the general comments, add a section with this information if it is not included.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-11** **Lines #:**
Specific Comment #:

Fish, first bullet – " . . . indicating that sediment PCB attenuation is occurring at a relatively slower rate than in fish and surface water." Delete "fish" given that attenuation rates in sediment have not been estimated and therefore cannot be compared to attenuation rates in fish.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-11** **Lines #:**
Specific Comment #:

Fish, second bullet – add Table 8-4 from the Area 1 SRI report to this section (Updated Cancer Risk Estimates and Hazard Quotients for Fish Consumption Pathway – 2009 95% UCL Fish Tissue Concentrations Smallmouth Bass and Carp). More detailed information about risk from fish consumption is needed in the FS to support remedial decision making.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-12** **Lines #:**
Specific Comment #:

Source Control, first bullet, 12th line – "Continued monitoring of PCB levels in fish is needed to evaluate long term recovery of PCB levels." Change "recovery of" to "reduction in." In the last sentence of this bullet, add the phrase "and other areas with potential unidentified hot spots."

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-13** **Lines #:**
Specific Comment #:

First full paragraph, 4th line – " . . . this potential was evaluated to address whether bank stabilization to control PCB loading from river banks in areas outside of the former impoundments should be considered in the Area 1 FS." Add the phrase "and to evaluate natural recovery potential" to the end of the sentence.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-14** **Lines #:**
Specific Comment #:

First full paragraph, last sentence – " . . . and would have to be almost completely eroded to equal just the annual PCB load from the former Plainwell banks." The purpose of the evaluation is not to determine the difference in the mass of PCBs remaining in the banks to the mass that was removed in the TCRAs, but rather to better understand the potential future PCB load to the channel sediments (and ultimately to fish tissue).

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-14** **Lines #:**
Specific Comment #:

Annual bank erosion was estimated as 1/10th to 1/100th of the bank inventory. Also report these estimates as bank erosion rates in feet per year and assess whether these rates are consistent with erosion rates estimated for the former Plainwell impoundment and similar river systems.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-14** **Lines #:**
Specific Comment #:

Last paragraph, 10th line – clarify what is meant by "the fine depositional sediment areas in the eroded portions of the Area 1 river channel."

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 3-15** **Lines #:**
Specific Comment #:

"This uncertainty does not reflect a data gap that limits choice of appropriate remedies, but is similar to the uncertainty regarding continued low level inputs from the adjacent watershed, the atmosphere, and upstream areas." Delete this sentence - a better understanding of the

degree to which PCB concentrations in fish tissue are likely to be reduced and over what time frame does in fact influence the choice of an appropriate remedy.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 5-2** **Lines #:**
Specific Comment #:

Section 5.1.1 – add Table 8-7 from the Area 1 SRI report (Risk-Based Concentrations for Fish and Sediments Derived by CDM (2003b) Based on the Angler Scenarios Evaluated in the CDM HHRA), and text to summarize how the RBCs were derived.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 5-2** **Lines #:**
Specific Comment #:

Section 5.1.1, second paragraph – "Consequently, although 0.33 mg/kg is a default detection limit, it also serves as an appropriate PRG believed to be protective of both human health and wildlife." Add more detail about the level of human health protection that is expected to be achieved, and justification for why a lower PRG (i.e., a PRG that would achieve a higher level of human health protection) was not selected.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 5-5** **Lines #:**
Specific Comment #:

In Table 5-1, add the pre- and post-remedy SWAC for the entire river section (river sections 2, 3, and 4) – the table appears to present the pre- and post-remedy SWAC for the hot spots only.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page #: 5-6** **Lines #:**
Specific Comment #:

8th line – " . . and the SWAC upstream of the former Plainwell Impoundment (again excluding Portage Creek) would decrease from the current estimate of 0.53 to a predicted value of 0.48 mg/kg . . ." Replace this phrase with a summary of pre- and post-remedy SWACs for river sections 2, 3, and 4.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page # 5-10** **Lines #:**
Specific Comment #:

First full paragraph – to complete the discussion, summarize the pre- and post-remedy SWACs for river sections 6-8 and Portage Creek.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page # 5-10** **Lines #:**
Specific Comment #:

Section 5.1.4 – for each additional RAL, describe the spatial distribution of the deposits above various RALs. Are the deposits contiguous, concentrated in a particular section of Area 1, or scattered throughout Area 1?

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix A **Page # 5-12** **Lines #:**
Specific Comment #:

50 mg/kg RAL – the text and Figure 5-13 indicate that the post-removal SWAC for the 50 ppm RAL is higher than the pre-removal SWAC.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: Section 1.1** **Lines #:**
Specific Comment #:

Section 1.1 - a first order trend model is used to determine historic rates of decline of fish tissue PCB concentration from 1993 to 2011. Analysis of first order decay processes in sediment and porewater is used to justify the use of a first order decay model for fish. Bioaccumulation processes should also be described and considered.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-2** **Lines #:**
Specific Comment #:

"This can be illustrated considering only the effect of burial of clean sediment on the surface sediment PCB concentration reduces to (Equation 1):" Change "burial of" to "burial by" and delete the phrase "reduces to." Why isn't Equation 1 used to estimate the recovery rate for sediments rather than assuming that the sediment recovery is the same as the predicted fish tissue recovery rates? Sediment transport and deposition processes control sediment recovery.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-3, 1-4** **Lines #:**
Specific Comment #:

The first paragraph on page 1-3 and second paragraph on page 1-4 only identify upstream and watershed sources as limiting the concentrations of PCBs in channel sediments. Revise the text to indicate that unremediated Area 1 sediments and floodplain soils also will be ongoing sources of PCBs to channel sediments that may limit the degree to which fish tissue PCB concentrations are reduced.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-4** **Lines #:**
Specific Comment #:

The estimated future fish tissue concentrations are converted to risk and hazard estimates. The presentation of the results would be simpler and easier to understand if the fish tissue concentrations were plotted and compared to RBCs and fishing advisory levels instead.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-4** **Lines #:**
Specific Comment #:

The last paragraph states that the natural recovery rates may be faster than historical rates because of the completed source control actions. However, it is more likely that the recovery rates will decrease as sediment and fish tissue concentrations approach equilibrium.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-5** **Lines #:**
Specific Comment #:

The fish tissue data for ABSAs 4.6 and 5 should be included and analyzed to evaluate whether and how the TCRAs influenced fish tissue concentration trends – was a step change observed?

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-5** **Lines #:**
Specific Comment #:

Please explain why the fish tissue reduction rates are estimated using wet weight data rather than lipid-normalized data. Add an analysis of the historical trends based on lipid-normalized data.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-6** **Lines #:**
Specific Comment #:

"The 2011 mean wet-weight fillet PCB concentrations were the starting point for projection of future concentrations . . .". The starting concentrations should be based on predicted concentrations from the historical trend model.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-5 and 1-6** **Lines #:**
Specific Comment #:

The analysis assumes that fish tissue concentrations will respond quickly (within 1 year) to changes in the sediment SWAC and that a step change in fish tissue concentration will occur when the active remediation phase is completed. Do the fish tissue data for ABSA 5 support this assumption?

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: Table E-1** **Lines #:**
Specific Comment #:

In Table E-1, the area and SWAC for river section 7 are shown as 28 acres and 0.90 mg/kg, respectively. The Area 1 SRI reports the area as 39 acres and the SWAC as 0.96 mg/kg. Additionally, the area of river section 5 is reported as 110 acres in the Area 1 SRI report and 105 acres in the FS report. Please reconcile these discrepancies.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: 1-8 and associated tables** **Lines #:**
Specific Comment #:

Revise Tables E-4 and E-5 or add new tables with columns that represent risk reduction targets (e.g. high end sport angler, ELCR 10^{-5}; high end sport angler, HI <1, advisory level one meal per week), the rows represent each river section, and the cells list the number of years to achieve the targets for a given river section.

Commenting Organization: CH2M HILL **Commenter: White**
Section: Appendix E **Page #: Section 1.1.5** **Lines #:**
Specific Comment #:

The discussion of uncertainty – revise this section to indicate that "other sources" include ongoing PCB loading from the banks and floodplains to the channel and the limited understanding of how these processes will limit reductions in channel sediment and fish tissue PCB concentrations. Last sentence on page 1-13 – change to "future recovery rates may change" – they are more likely to decrease as the system approaches equilibrium than to be expedited. Note that key uncertainties will be addressed through collection of long-term monitoring data to verify the assumptions used in the recovery models.